A Tale of Two Stimulus Payments: 2001 vs. 2008

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In response to the sharp drop in economic activity, employment, and earnings that took place around the Great Recession, governments around the world put in place substantial stimulus packages. The exact composition of these fiscal interventions varied substantially across countries, but a common ingredient was the disbursement of fiscal stimulus payments (or tax rebates) to households. Examples of this policy instrument can be found in the most recent stimulus plans in the U.S., Australia, and the U.K., as well as in fiscal policy responses to previous recessions.

The key advantage of fiscal stimulus payments is their ease of implementation and, therefore, the speed at which they "put cash in consumers' wallets," compared to large scale government purchases or monetary policy interventions which are known to have lagged effects on the real economy. Their objective is twofold: alleviating households' economic hardship and setting in motion a "fiscal multiplier" that, in some cases, can have a short-run beneficial effect reaching beyond the handout recipients. A necessary condition for the policy to achieve these objectives is that the household marginal propensity to consume (MPC) out of the stimulus payment be substantial.

Estimating empirically the size of the MPC out of tax rebates (or, more in general, out of anticipated and transitory income changes) can be challenging (see Jappelli and Pistaferri, 2010, for a recent survey). Recently, significant progress has been made in measuring the consumption responses to the U.S. stimulus payment episodes of 2001 and 2008. Using data from the Consumer Expenditure Survey (CEX), Johnson, Parker, and Souleles (2006, hereafter JPS), and Parker, Souleles, Johnson, and McLelland (2011, hereafter PSJM) cleverly exploited the randomized timing of the receipt of payments to estimate their effects on household nondurable consumption expenditures. This body of evidence contains two important results.

First, in both episodes, the consumption response is strong: between 15 and 25 percent of rebates are spent by households on nondurables in the quarter that they are received. This consumption response is measured relative to the (comparable, because of the randomization) group of households who do not receive their payment in that quarter. Second, even though the point estimates are not very precise (especially for the 2001 episode), the findings point systematically to lower consumption responses in 2008 compared to 2001, by 5 to 10 percentage points.[1]

Standard consumption theory falters when forced to confront these findings. The permanent-income hypothesis (PIH) predicts a zero MPC out of anticipated transitory income changes. In the standard-incomplete markets model (SIM), the only agents whose consumption reacts significantly to the receipt of a rebate are those who are liquidity constrained. However, under parameterizations where the model's distribution of *net worth* is in line with the U.S. data, the fraction of constrained hand-to-mouth households is too small (usually below 10%) to generate a big enough consumption response in the aggregate.

In Kaplan and Violante (2013, hereafter

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[1] Broda and Parker (2013) conducted a survey of roughly 60,000 households in Nielsen's consumer panel in order to assess how much of the 2008 stimulus payment they spent. Because of the large sample size, their estimate are very precise and indicate a consumption response of roughly 15 percent in the quarter of receipt of the stimulus payment.

KV), we develop a framework that is better equipped to speak to that evidence. In our model, households can access two types of saving instruments: a liquid asset (e.g., cash, or bank account) and an illiquid asset (e.g., housing, or retirement wealth). The trade-off between liquid and illiquid asset is that the latter earns a higher return, but it can be accessed only by paying a transaction cost.

Besides the usual small fraction of *poor hand-to-mouth* agents with zero net worth, our model features a significant number of what we call *wealthy hand-to-mouth* households. These are households who own some illiquid wealth, yet optimally choose to consume all of their randomly fluctuating earnings every period, instead of maintaining a smooth consumption profile. The reason for this behavior is that such households are better off bearing the welfare loss of consumption fluctuations rather than smoothing income shocks because this latter option requires either (i) frequently paying the transaction cost to tap into their illiquid wealth; or (ii) holding large balances of cash and foregoing the high return on the illiquid asset; or, still, (iii) obtaining credit at expensive interest rates. This explanation is reminiscent of Cochrane's (1989) insight that, in some contexts, the utility loss from setting consumption equal to income, instead of fully optimizing, is second order. It is because of these additional wealthy hand-to-mouth households that our model is able to generate average consumption responses to fiscal stimulus payments which are close to the estimated ones, and an order of magnitude larger than in the SIM model.

In this paper, we ask whether our model can also reproduce the finding that the consumption response in 2008 is somewhat smaller than the one in 2001. We begin by describing the differences between these two historical episodes.

I. The Stimulus Payments of 2001 and 2008: Differences in Design and Economic Environment

The Economic Growth and Tax Relief Reconciliation Act (EGTRA) of 2001 reduced the tax rate applied to income in the lowest tax bracket from 15 percent to 10 percent, with the change applied retroactively to income earned from the start of 2001. The tax rebates represented an advance payment of this tax cut for 2001. The first income tax bracket applied to the first $6,000 of income for a single individual filing a return ($12,000 for a married couple filing jointly), so that most households received rebates of $300 or $600. According to data reported by JPS, the median check per recipient was roughly $500. In aggregate, the 2001 tax rebates totaled $38 billion, or 1.5 percent of GDP in the third quarter of 2001.

The Economic Stimulus Act (ESA) of 2008 provided stimulus payments which consisted of a basic transfer and – conditional on eligibility for the basic payment – a supplemental payment of $300 per child that qualified for the child tax credit. The basic payment was generally the maximum of $300 ($600 for couples filing jointly) and their tax liability up to $600 ($1,200 for couples). Households without tax liability received basic payments of $300 ($600 for couples) as long as they had at least $3,000 of qualifying income. Moreover, the total stimulus payment phased out with income, being reduced by five percent of the amount by which adjusted gross income exceeded $75,000 ($150,000 for couples). According to data reported by JPSM, the median check per recipient was roughly $1,000. In aggregate, the stimulus payments in 2008 amounted to about $100 billion, or 2.2% of quarterly GDP.

Comparing these two stimulus payment episodes, three main differences appear in the *design* of the experiment. First, in 2008 the size of the rebate was twice as large. Second, the 2008 stimulus payments was phased out at high income levels. Third, in 2008 households needed to have at least $3,000 of taxable income. Beyond these divergences in policy design, there were two important differences in the macroeconomic *environment* of 2001 and 2008. In 2001, the tax rebate was part of a comprehensive tax reform that decreased federal personal income tax rates at all income brackets. The

majority of these changes were phased in gradually over the five years 2002-2006. According to the bill passed in Congress, the entire Act would "sunset" in 2011. Instead, the bill was ultimately renewed in December 2010 for a further two years. Moreover, the 2008 recession was a lot deeper and longer than the downturn of 2001.

In the rest of the paper, we describe the KV model and the key steps of the model parameterization. Next, we use this framework to analyze how differences in design and economic environment between 2001 and 2008, individually and jointly, could have affected the estimated household consumption response.

II. Model and Parameterization

Our framework integrates the classical Baumol-Tobin model of money demand into a partial equilibrium version of the workhorse incomplete-markets life-cycle economy. Households live for T periods: they work part of their life and are retired thereafter. During the working life, their labor income has a component that grows deterministically, and a stochastic component subject to idiosyncratic random fluctuations. Retirees receive social security benefits which are a function of their lifetime earnings.

Households discount the future at rate β and have recursive preferences in the Epstein-Zin-Weil class defined over non-durable consumption and a service flow from housing. They can hold a liquid asset m and an illiquid asset a. The illiquid asset pays a financial return r^a and (its housing component) yields a direct consumption flow, while positive balances of the liquid asset pay a return r^m. Both rates of return are exogenous. When the household wants to make deposits into, or withdrawals from, the illiquid account, it must pay a fixed transaction cost κ. The trade-off between these two saving vehicles is that the illiquid asset earns a higher return (in the form of capital gain and consumption flow) but its adjustments are subject to the transaction cost. Illiquid assets are restricted to be always non-negative, but we allow borrowing

in the liquid asset at rate $\bar{r}^m > r^m$ to reflect the availability of unsecured credit.

We now summarize the key features of the model's parameterization. The discount factor β is set to replicate median illiquid wealth (as a fraction of average income) in the Survey of Consumer Finances (SCF), and hence our results are not driven by an implausibly low discount factor that makes households extremely impatient. We set the coefficient of relative risk aversion to 4, and the elasticity of intertemporal substitution to 1.5. Earnings risk is modelled as a unit root process, whose variance is chosen to reproduce the growth in the age-profile of the cross-sectional variance of log earnings observed in the data.

Our definition of liquid assets comprises cash, money market, checking, savings and call accounts plus directly held mutual funds, stocks, bonds, and T-Bills net of revolving debt on credit card balances. The 2001 SCF reveals that household's median balance of liquid wealth was $2,700. Illiquid wealth includes housing net of mortgages and home equity loans, retirement accounts (e.g., IRA, 401K), life insurance policies, CDs, and saving bonds. Median illiquid asset holdings were $55,000 in 2001. When we compute the risk-adjusted after-tax real rates of return for the two assets, we obtain -1.48% for liquid wealth, 2.29% for illiquid wealth. The annual service flow from the housing component of illiquid wealth is estimated to be 4% of the value of the stock. This service flow raises the effective return on the illiquid asset.

The transaction cost κ and the interest rate on credit card debt $\bar{r}^m$ are chosen to match the proportion of wealthy and poor hand-to-mouth households in the data. Broadly speaking, in our baseline definition a household is hand-to-mouth if her average holdings of liquid wealth are less than half the income earned over the pay-period. Whether the household, at the same time, owns illiquid wealth determines whether she is poor or wealthy hand-to-mouth. In KV, we discuss an identification strategy that provides a *lower bound* for this measurement and that, applied to SCF data, indicates that between 20 and 40 per-

cent of US households may be in this group, with 2/3 of them being wealthy and 1/3 poor hand-to-mouth. In KV, we took a conservative approach and targeted a number in the middle of the 20-40 percent range. Here, we let the steady-state of the model replicate the upper end of this range, and set $\kappa = \$1,000$ and $\bar{r}^m = 15.5\%$ (expressed in annual nominal terms). The advantage of this calibration approach is that it allows us to match, roughly, the empirical size of the rebate coefficient for 2001.

III. Experiments and Results

We begin with replicating the 2001 tax rebate episode in the model. The economy is in a stationary equilibrium when households are reached by three pieces of unexpected news. First, a recession of the depth and length of the 2001 downturn is beginning. Second, a tax reform with the same key characteristics, phasing-in, and sunsetting, as the one implemented by the EGTRA is in place. The tax cut is deficit-financed for ten years, after which the payroll tax is increased permanently (by roughly 0.2%) to gradually reduce the debt to its pre-reform level. Finally, a tax rebate of $500 will be distributed to half of the population in the current quarter and to the other half in the next one. Therefore, the rebate is a surprise for half of the (randomly chosen) recipients and is anticipated by the other (randomly chosen) half.[2]

We then compute the transitional dynamics of the economy and we run the same regression as JPS on our simulated panel of households to measure the model's consumption response of rebate recipients relative to the control group of non-recipients. As we emphasize in KV, the estimated regression coefficient, the *rebate coefficient*, is not an MPC out of the check, but it is the difference between the MPC out of the check (for the treatment group) and the MPC out of the news (for the control

group). We find consumption responses of 27.1%, i.e., roughly the same size as the JPS empirical estimate for 2001. A simple back of the envelope calculation is useful to understand how this number is obtained. In the model, along the transition induced by the recession and the tax reform, almost half of households are hand to mouth, and their MPC out of the check is around 50%, and out of the news is zero. The rest of the households in the economy have similar MPC to check and news because they are unconstrained, and hence they do not affect much the size of the rebate coefficient.

We now introduce, one by one, the differences in design and economic environment described in Section I. The results are in Table I, line (a) denominated "1/2 hand-to-mouth."

Size of the payment. When the payment is doubled to $1,000 (as for 2008), the rebate coefficient falls to 17.8%. As explained in KV, if the transfer is large enough, it loosens liquidity constraints, and even constrained households find it optimal to save a portion of their payment. Moreover, the larger the rebate, the more likely it is that households who were close to the adjustment threshold before the rebate, cross it and make a deposit into the illiquid asset upon receipt of the rebate. However, adjusting households are unconstrained, so they end up saving a large portion of the rebate.

Targeting of the policy. The first difference in household targeting of the policy between 2001 and 2008 is the phasing out at, roughly, three times average earnings ($150,000). Table I shows that the phasing out has virtually no effect, since such high earners are highly unlikely to be poor or wealthy hand-to-mouth. The second difference is that in 2008 the very low-income households (with taxable income below $3,000) did not qualify for the payment. When we exclude these households from the transfer recipients (approximately 5% of the model's population) the rebate coefficient falls to 26.5%. The reason is some of these households are poor hand-to-mouth, but the effect is not large because the correlation between income level and

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[2]In line with this assumed information structure, for the 2008 episode Broda and Parker (2012) document that no more than 60% of households learned about the policy in the quarter before payments begun to be disbursed by the Treasury.

Table 1—Decomposition of the differences between 2001 and 2008

	2001	(1) Size of Transfer	(2) Phasing Out	(3) Minimum Income	(4) No Tax Reform	(5) Deeper Recession	(1)-(5) 2008
1/2 hand-to-mouth	0.271	0.178	0.271	0.265	0.241	0.309	0.187
1/3 hand-to-mouth SIM model	0.150	0.119	0.150	0.136	0.163	0.184	0.108

hand-to-mouth status is weak.[3]

Tax reform. The 2001 tax rebate was an advance payment of a tax cut which was kept in place for another decade. As a result, it had a more persistent nature than the 2008 fiscal stimulus payment. Under Ricardian neutrality, this feature would not make much of a difference but our economy is non-Ricardian (because of liquidity constraints, finite life, distortionary taxes, etc..), so one would expect a bigger consumption response in 2001.

The other tax cuts contained in the tax reform increase households' desired level of lifetime consumption which, in turn, triggers two offsetting forces. Some households run down their liquid saving all the way to zero, but choose not to borrow or withdraw from their illiquid account if they have a positive balance), and become hand-to-mouth. Others who are, or are close to being, hand-to-mouth start borrowing and are able to smooth consumption well.

As shown in Table I, when we remove the tax reform, the rebate coefficient drops to 24.1%, meaning that the tax reform contributed somewhat towards a stronger consumption response in 2001.

Depth of the recession. The 2008 recession was deeper and longer than the 2001 downturn. Based on NIPA data, we model it as a drop of 6% in average labor income followed by a gradual recovery lasting for 4 years. A recession is a temporary fall in aggregate income which households desire to smooth by dissaving or borrowing. Households for which this smoothing behavior is

[3]As we explain in KV, the ratio of liquid assets to income is a much stronger predictor of hand-to-mouth status than income alone.

prolonged end up with zero liquid assets and, possibly, are unwilling to use expensive credit, or end up hitting their credit limit. Table I shows that, indeed, this more severe recession increases the number of hand-to-mouth households in the economy (both those at zero liquid wealth and those at their credit limit) and adds roughly 3.8 percentage points to the rebate coefficient.

2001 vs. 2008. When combining together all the differences in design and environment, we find a rebate coefficient of 18.7% for 2008, or roughly 2/3 of its 2001 counterpart. The differences in economic environment (milder recession and tax reform in 2001) seem to offset each other, and the smaller transfer induced a larger consumption response.

Next, we consider the "conservative" calibration of the model, as in KV. There, we target 1/3 of the population as hand-to-mouth, and 1/4 of the population borrowing on credit cards. The transaction cost is still $\kappa = \$1,000$. The key difference in the calibration is that the nominal interest rate on borrowing is lower, 10% per year. The results of the experiments are in line (b) of Table I labelled "1/3 hand-to-mouth". Under this calibration, the rebate coefficient for 2001 is 15%, and for 2008 is 10.8%, confirming the finding that the differences in design and environment in 2008 lead to consumption response which is, roughly, 2/3 of its 2001 counterpart.

All of the individual differences in design and environment have the same qualitative impact described above, except for the tax reform. Absent the tax reform, the rebate coefficient is higher. The reason is that, under this calibration with relatively cheap credit, most households who expect

their disposable income to grow in the future, choose to borrow instead of remaining hand-to-mouth.

Finally, we run the same set of experiments in the standard one-asset incomplete-market model (line (c) in Table I labelled "SIM model"). The SIM model is calibrated to reproduce some key observations about the distribution of *net worth*. For example, the discount factor β is set to replicate median net worth (as a fraction of average income), and the risk-adjusted after-tax real rate of return is set to 1.67%.[4] Table I shows that the rebate coefficients in the SIM model are tiny, and that the model does not produce any significant difference across the two episodes.

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[4]We still let the housing component of net worth yield a consumption flow of 4% per year. See KV for details.